QTG simulation needs for ALD's charge

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QTG simulation needs for ADL's charge

Want to evaluate performance of various tracking options

Focus on Upsilon measurement

Use the same technique for each tracking configuration

Figures of merit

- Mass resolution
- Signal statistical precision
  - Depends on yield, background

What do we need?

A) Standalone tracking

B) Fast simulation for matching of track projections to the EMCal, HCal
- E/p distribution vs p
- dphi, dz distributions vs p
- Make eID cuts from these

C) Fast simulation of background shape due to **fake** electrons
- From accidental alignment of pion tracks (real and fake) with calorimeter clusters

D) Fast simulation of background shape due to **real** electrons

E) Sampling and **mixing** of C) and D) to make estimated background spectrum

F) Signal generation (include embedding efficiency somehow)

G) Add estimated background and signal to make “foreground” spectrum

H) “Mixed event background” (= C) with much increased statistics and then normalized)

This should be redone for every tracking configuration change!

Method

Signal estimation

Throw Upsilons, run tracking, reconstruct electrons

Tracking and eID efficiency => fraction of Upsilon yield reconstructed

Embedding efficiency (separately, or as part of the above)

Random background estimation

Perform for tens of thousands of Hijing events

Difference between configurations is in efficiency, number of fake tracks

- Perform tracking, get list of tracks
- Fast simulations for matching to EMCal, HCal
- Get list of identified "electrons"
- Make all +/- pairs of "electrons"
- Parameterize p_T distribution of "electrons"
- Use parameterization as input to fast simulation of background
  - Need to include suppression of pions somehow

Real (open HF) background estimation

Difference in configs depends only on detector efficiency, right?

Determine efficiency vs electron p_T for this config.

Fast sim using parameterization of measured open HF electron p_T shape

- normalized to match measured open HF cross section

Overall background estimation

Difference in configurations follows from random, real mixing

Mix random and real background components in fast simulation

Configurations

Configurations before TPC simulation is available

Start with 7 layer MAPS tracker
Drop IB to 2 layers
Drop IB to 1 layers
 Drop outer layers to two with 3 layer IB

Configurations after TPC simulation is available

Start with TPC + 3 layer IB + intermediate layer
Drop intermediate layer
Drop IB to 2 layers
Drop IB to 1 layer

Who does what?

Signal generation and embedding efficiency

Track matching to EMCal, HCal

Background shape due to fake electrons

Background shape due to open HF electrons

Forming mixed background

Yield extraction and precision estimates